Determinants of inappropriate acute pain management in old people unable to communicate verbally in the emergency department

DETERMINANTS OF INAPPROPRIATE ACUTE PAIN MANAGEMENT IN OLD PEOPLE UNABLE TO COMMUNICATE VERBALLY IN THE EMERGENCY DEPARTMENT

INTRODUCTION

Oligoanalgesia in the Emergency Department (ED) represents a daily challenge for emergency physicians and previous studies have shown that up to 60% of patients with pain did not receive adequate treatment in such a setting [1].

Routine pain assessment in adult patients improves pain management and is essential for effective care [2], especially among individuals unable to communicate (defined as unable to communicate verbally, UCV), which cannot formulate and express their discomfort [3].

Elderly patients represent a large portion of the population of the ED [4]. A recent international statement recommended that comprehensive pain assessment in older people should include self reports, when possible [5], but this can be challenging since impaired mental status occurs in approximately 25% of this population [6, 7]. In such cases, behavioural observations can provide insights to the presence of pain. Recently, the ALGOPLUS Pain Scale has been tested in the ED to measure pain in a geriatric non-communicative population [8].

To our knowledge, no previous studies have analysed factors predicting oligoanalgesia in these vulnerable patients.

Figure 1 shows the Direct Acyclic Graph (DAG) illustrating the possible framework of "analgesia pathway" in the ED. DAG is a graphical tool for epidemiological research that allows doctors to directly specify a causal pathway and model, in order to avoid biased estimates of the covariate effects on the outcome [9]. In our opinion, oligoanalgesia may be due to three determinants: I) patients' status (caregiver's presence, marital status, educational attainment, retirement home residence), II) attending physician's characteristics (age expressed as proxy of years from medical degree and gender), and III) pain etiology.

The aim of our work is to evaluate variables that could influence ED pain treatment in UCV patients. [10, 11].

MATERIALS AND METHODS

Study design, setting and selection of participants

This was an observational prospective study conducted at the ED of the **** Hospital in ****, an urban non-teaching hospital in ****, with an annual census of about 80,000 patients. At the onset of

the study no locally approved analgesic protocol for the ED existed.

Between November 2010 and June 2011, during triage evaluation, a random sample of UCV patients presenting with acute pain.

The entire ED medical staff was involved in the study and were kept blind to the study outcomes.

All UCV patients, over 65 years, presenting with acute pain (including traumatic injuries, e.g. fractures, abdominal, musculoskeletal, thoracic pain, and acute peripheral vascular disease) [12-15] were eligible.

UCV patients were defined as patients with delirium (screened using Confusion Assessment Method [16]), and/or aphasia, moderate-to-severe cognitive impairment (detected using a Six Item Screener in the ED setting [17]), and/or poor/null knowledge of the Italian language, and/or unable to fill out self-rating scales.

Exclusion criteria were absence of pain, chronic pain (length > 2 weeks), narcotic pain medications received in pre-hospital care, hemodynamic instability patient or caregiver unwilling to provide informed consent for participation.

The study was approved by the Hospital Review Board, and was conducted in accordance with the principles of the declaration of Helsinki for clinical research involving human subjects.

Methods of measurement and outcome measures

Data were collected using an *ad hoc* spreadsheet including age, gender, ethnicity, triage priority level (emergency or urgency, and semi- or non-urgent), educational level (expressed as years of training), residence characteristics (home vs retirement home), length of stay in ED (in days), age and gender of physician in charge for each patient, presence of a caregiver, marital status (married or unmarried), details on location and duration of pain.

ALGOPLUS Pain Scale was used to assess pain severity: a score higher than 2 in a scale of 5 points was considered the threshold for the presence of acute pain (Figure 2, [8]).

All drugs prescribed to reduce pain, such as acetaminophen, non-steroidal anti-inflammatory drugs, opioids and others (e.g. antacids for abdominal pain, or nitrates for chest pain, etc) were categorised as analgesic.

Outcomes

The aim of our study is to investigate the prescription of ED pain treatment and its possible determinants. Secondary outcomes included details on drugs used, time to administration and length of stay in the ED [10, 11].

Statistical analysis

Descriptive results are presented as mean (+/- standard deviation) or median (and interquartile range, IQR) for continuous variables, and numbers and percentages for categorical variables.

The chi-square test was used to assess associations between categorical variables. Continuous variables were compared using ANOVA and the Wilcoxon test.

Based on the previous international literature and the DAG (see Figure 1), we chose the variables to include di our models. Then unconditional multivariate logistic regression models were used to evaluate the relationship between clinical features and pain therapy proxies. Any ED pain medication, any opioid drugs used in the ED, discharge pain treatment, timing of pain therapy for all enrolled patients, and for those triaged as low-urgent risk were used as dependent variable in each models and we chose different covariates for each multivariate models in order to avoid the risk of saturate them (independent variables chosen were showed in table 2).

All tests were two-tailed, and p values < 0.05 were considered statistically significant.

Analyses were performed using the NCSS 2007 statistical program and Stata 13.1 (Stata Corporation, College Station, Texas, USA) [18].

RESULTS

A total of 257 patients were enrolled. The male/female, M/F, ratio was 0.56, with a median age of 85 years, (interquartile range [IQR] 13 years, range 65 - 103 years). Patients' characteristics are summarized in Table 1.

Eighty-nine patients presented with abdominal pain, 74 with limb pain (57 from legs and 17 from arms), 45 with headache, 25 with chest, and 24 with spine pain. The median age of ED staff physician was 41 years (IQR 10 years, range 30-60) and most of them were men (M/F ratio 4.8).

Eighty two patients (31.9%) received an analgesic treatment in an average time of 37.4 minutes (95% CI 28.5 to 46.2).

The most commonly administered medications were acetaminophen in 23 patients (28%), opioids in 22 patients (26.8%), and non-steroidal anti-inflammatory drugs in 19 patients (23.3%).

The route of administration was intravenous for almost the entire cohort (80 patients, intramuscular route was used in 2 cases).

Sixty-six patients were presented to the ED from home and in most of the cases (93.9%) with a caregiver (i.e. a relative, or a carer, or a friend); only 16 patients presented from a residence home and 62.5% of them with a caregiver.

Table 2 summarized results of multivariate logistic models.

In almost all performed models, the presence of a carer was significantly associated with an increased probability of occurrence of the dependent variable (expect for the evaluation of discharge pain therapy).

DISCUSSION

This is a mono-centric prospective observation study, conducted in a second level ED located in an urban teaching hospital affiliated with university. The hospital has specific palliative and pain services. During a period of eight months, 257 patients were enrolled in the ED. Medical staff involved in the research were heterogeneous for gender, age and background (including internal and emergency medicine, hematology, pulmonary medicine, geriatrics, general and orthopedic surgery).

In almost all our models, we found a causal relationship between outcome (i.e. any pain medication in the ED, any opioid medication, pain therapy in an appropriate time for all patients and only for those triaged as low-urgent) and presence of a caregiver for UCV patients.

In North America, some studies have shown that the main factors related to oligoanalgesia are age, cognitive impairment, ethnicity, providers' perception of patients' pain and crowding [19].

Consistently with these results, in our cohort only 31,9% of UCV patients received a pharmacological treatment.

Also our results seemed to underline that older UCV patients were at risk of poor or inadequate ED pain care for all types of pain, suggesting a specific need of attention for this ED population. In particular, patients with lower extremity and head pain might not receive any analgesic treatment.

Several explanations could justify this phenomenon. First, pain evaluation is equivalent to recognizing its presence, but a correct assessment may be difficult in the UCV population. Second, the study included a heterogeneous group of patients with different forms of cognitive impairment and variable treatment regimens due to individual providers' characteristics (gender, age, background and previous studies), likely related to different approaches to pain management in schools of medicine and residency programs over the last decades. Third, it is possible that patients with lower extremity pain may have already been treated with non-pharmacologic therapies such as ice or heat, splint or bandage before the ED admission. Fourth, in some cases physicians did not administrate pain killers according to an old opinion which pain management have to be avoided before identifying the underlying causes of pain [20]. Fifth, Emergency physicians may choose not to administer analgesics in consideration of the potential short-term/long term adverse events, in particular for multi-drug treated patients. Sixth, there are no validated guidelines for treatment of headaches in older patients with head trauma. High suspicion, prolonged observation and a more frequent use of brain imaging represent reasonable approaches for these patients [21].

Our study underlines the important role of caregivers in pain management. Caregivers could be spouses, family members, friends and even healthcare personnel, such as doctors and nurses. In many cases they are wives or husbands who are themselves elderly with increased risks for physical injury or medical illness. Some caregivers even feel stressed, anxious and depressed due to their

role. These people run the risk of not providing adequate support to the patient, and of negatively influencing pain management.

For all of these reasons, in our setting, marital status probably did not influence pain management [22].

Therefore, since patients with cognitive impairment are likely to be nonverbal communicators, obtaining information from caregivers about patients' pain history, expressions, and preferred treatments is essential. Our results are consistent with previous data suggesting carer's presence influence pain management in the ED [23]. In addition, a shared care plan involving caregiver or nursing staff and primary care physician should be organized before the discharge.

In the present study we did not find an association between education level and pain management (for all outcome and in all univariate models - results did not showed) and we avoided to use this variable in the multivariate models. This was surprising, as other studies suggested low educational attainment, generally measured as years of school, is a well-established risk factor for dementia among older adults. On the other side, high educational levels are usually related to the probability of being assisted by a dedicated caregiver [24].

We have to consider that in elderly patients, dementia is also a risk factor for delirium. For sure, when patients suffer from delirium superimposed on dementia (or other cognitive impairments), pain management becomes more complex.

Regarding pain management, pharmacological treatment is an integral component of management for most patients and becomes more important in patients with cognitive impairment for whom not pharmacological self-management techniques are less possible.

A rapid pain treatment in these patients is related to several factors, 1) cognitive impairment affects pain perception but not its sensation; 2) untreated pain is potentially dangerous in these patients; 3) dementia impairs individual's perception of pain and the ability to report and recall it, to evaluate and communicate about relief. Amount of unrecognized pain is greater in patients who cannot evaluate and/or verbally express their sufferance [25].

Indication of a rapid pain treatment in patients with dementia is reinforced by interaction of cognitive and functional impairment, pain, and behaviour. People with dementia have substantial functional impairment that is certainly exacerbated by pain [26].

Opioid administration is considered as an important indicator of pain management quality. Literature suggests that physicians' biases and knowledge deficits are the main cause for improper pain management in the elderly and misconceptions most commonly occur with treatment using opioids [20].

Trauma may also be the onset of other diseases such as acute myocardial infarction, sepsis,

medication toxicity and acute abdominal pathology [27].

It is possible that knowledge of active mechanisms could favour opioid administration without fear of unmasking the correct diagnosis. However, the traditional narcotic analgesia can cause delirium and increase the risk of falls. For that reason, ED physicians should always consider side effects of opioids (constipation, confusion, and sedation) especially in the elderly population [28, 29].

Self-evaluation may be more difficult in patients with multiple comorbidities, cognitive impairment, sensory dysfunction and behavioural changes. In this population, compassion and communication skills are considered key elements to treat pain, which is a complex multifactorial experience by definition.

However, it is important to reflect on some interesting general observations made in recent literature related to physician traits [30].

Multiple physician' characteristics (e.g., type of training, clinical experience, perception of patient's pain, gender, age) can contribute to variability in pain management. Training and years of practice are associated with disparities in ED pain management. Recently, Safdar et al. have shown that female physicians are more inclined than men to administer analgesics to patients, even those with severe pain [31].

LIMITATIONS

Our study collected data in a single, university affiliated, center in ****, thus external validity is uncertain, but, despite this limitation, we collected data of randomly selected patients with low risk of selection bias.

We did not collect data on non-pharmacologic therapies recommended in patients with pain in the ED. In this case, we may have slightly underestimated oligoanalgesia but, since this type of treatment is infrequent in an acute care setting, we probably did not affect our results due to this missing data.

The experience of pain can be different in distinct types of dementia. We did not have the possibility to collect data about types of dementia (e.g. Alzheimer's disease, vascular dementia, fronto-temporal dementia) because not all patients provided a complete history during evaluation in the ED and it was not possible to link our records to the hospital registry, partly because not all enrolled patients have a record in our hospital.

Moreover, the medical record oversimplifies what is actually a more complex situation and it could underestimate effective pain treatment.

Additionally, we could not analyze "oligoanalgesia" as a single variable, but in accordance with other studies we have considered "drug administration, opiate analgesia and time of administration", as good pain management indicators.

CONCLUSION

Results of this study suggest that older UCV patients presenting to the ED with pain are at high risk of poor or inadequate analgesia for all types of pain.

In these patients healthcare providers should always suspect presence of pain and an increasing need for behavioural pain evaluation is necessary for a complete assessment.

To our knowledge, our study was the first in **** aimed at determining factors related to oligonalgesia in the population of patients presenting to the ED.

Staff training on pain management could result in better assessment, treatment, and interaction with caregivers, particularly when a larger number of staff components are available. Further studies are required to confirm our results.

REFERENCES

1. Allione A, Melchio R, Martini G, Dutto L, Ricca M, Bernardi E et al. Factors influencing desired and received analgesia in emergency department. Intern Emerg Med 2011; **6**:69-78.

2. Joint Commission on Accreditation of Healthcare Organizations. Comprehensive accreditation manual for hospitals. Joint Commission on Accreditation of Healthcare Organizations, 2006 Oakbrook Terrance.

3. Herr K, Coyne PJ, Key T, Manworren R, McCaffery M, Merkel S, et al. Pain assessment in the non verbal patient: position statement with clinical practice recommendations. Pain Manag Nurs 2006; **7**(2):44-52.

4. Mion LC, Palmer RM, Anetzberger GJ, Meldon SW. Establishing a casefinding and referral system for at-risk older individuals in the emergency department setting: the SIGNET model. J Am Geriatr Soc 2001; **49**:1379-1386.

5. Hadjistavropoulos T, Herr K, Turk DC, Fine PG, Dworkin RH, Helme R et al. An interdisciplinary expert consensus statement on assessment of pain in older persons. Clin J Pain 2007; **23**:S1-43.

6. Hustey FM, Meldon SW. The prevalence and documentation of impaired mental status in elderly emergency department patients. Ann Emerg Med 2002; **39**:248-253.

7. Hustey FM, Meldon SW, Smith MD, Lex CK. The effect of mental status screening on the care of elderly emergency department patients. Ann Emerg Med 2003; **41**:678-684.

8. Rat P, Jouve E, Pickeing G, Donnarel L,Nguyen L, Michel M, et al. Validation of an acute pain-behavior scale for older persons with inability to communicate verbally: Algoplus. Eur J Pain 2010; **15**(2):1988 e1-198 e10.

9. Greenland S, Pearl J, Robins JM. Causal diagrams for epidemiologic research. Epidemiology 1999; **10**:37-48.

10. Todd HK, Ducharme J, Choiniere M, Crandall CS, Fosnocht DE, Homel P, et al. Pain in the emergency department: results of the pain and emergency medicine initiative (PEMI) multicenter study. J Pain 2007; **8**:460–466.

11. Arendts G, Fry M Factors associated with delay to opiate analgesia in emergency departments. J Pain 2006; **7**:682–686.

12. Manfredi PL, Breuer B, Meier DE, Libow L. Pain assessment in elderly patients with severe dementia. J Pain Symptom Manage 2003; **25**:48–52.

13. Schuler M, Njoo N, Hestermann M, Osler P, Hauer K. Acute and chronic pain in geriatrics: clinical characteristics of pain and the influence of cognition. Pain Med 2004; **5**:253–262.

14. Nygaard HA, Jarland M. Are nursing home patients with dementia diagnosis at increased risk for inadequate pain treatment? Int J Geriatr Psychiat 2005; **20**:730–737.
15. Pickering G, Jourdan D, Dubray C. Acute versus chronic pain treatment in Alzheimer's disease. Eur J Pain 2006; **10**:379–384.
16. Monette J, Galbaud du Fort G, Fung SH, Massoud F, Moride Y, Arsenault L, et al. Evaluation of the Confusion Assessment Method (CAM) as a screening tool for delirium in the emergency room. Gen Hosp Psychiatry. 2001; **23**:20-25.
17. Wilber ST, Lofgren SD, Mager TG, Blanda M, Gerson LW. An evaluation of two screening tools for cognitive impairment in older emergency department patients. Acad Emerg Med. 2005; **12**:612-616.
18. Hintze J NCSS, LLC. Kaysville. 2008 Utah. http://www.ncss.com
19. Hwang U, Richardson LD, Harris B, Morrison S. The Quality of Emergency Department Pain Care for Older Adult Patients. J Am Geriatr Soc 2010; **58**:2122–2128.
20. Herr KA, Garand L. Assessment and measurement of pain in older adults. Clin Geriatr Med 2001; **17**:457–78.
21. Rathlev NK, Medzon R, Lowery D, Pollack C, Bracken C, Barest G. Intracranial pathology in elders with blunt head trauma. Acad Emerg Med 2006; **13**:302-307
22. Varela G, Varona L, Anderson K, Sansoni J. Alzheimer's care at home: a focus on caregivers strain. Prof Inferm 2011; **64**(2):113-117.
23. Mentes JC, Teer J, Cadogan MP. The pain experience of cognitively impaired nursing home residents: Perceptionsof family members and certified nursing assistants. Pain Manag Nurs 2004; **5**:118–125.
24. Hosseinpoor AR, Bergen N, Chatterji S. Socio-demographic determinants of caregiving in older adults of low- and middle-income countries. Age Ageing 2013; **42**(3):330-338.
25. VHA Pain Management. Clinical tools: Assessment resources [monograph on the Internet]. Washington (DC):Department of Veterans Affairs; 2007 [cited 2006 Oct 23].Available from: http://www1.va.gov/Pain_Management/
26. Jakobsson U, Klevsgard R, Westergren A, Hallberg IR.Old people in pain: A comparative study. J Pain SymptomManage 2003; **26**:625–636.
27. Sanders AB. Changing clinical practice in geriatric emergency medicine. Acad Emerg Med 1999; **6**:1189-1193.
28. Norton C. Constipation in older patients: effects on quality of life. Br J Nurs 2006; **15**:188–92.
29. Williams R, Bosnic N, Duncan AW, Brogan M, Cook SF. Prevalence of opioid dispensings

and concurrent gastrointestinal medications in an elderly population from Ontario, Canada. J Opioid Manag 2008; **4**:193–200

30. Lazkani A, Delespierre T, Benattar-Zibi L, Bertin P, Corruble E, Derumeaux G, et al. Do male and female general practiotioners differently prescribe chronic pain drugs to older patients? Pain Med 2015; 16(4):696-705.

31. Safdar B, Heins A, Homel P, Milner J, Neughbor M, DeSandre P, et al. Impact of physician and patient gender on pain management in the emergency department—a multicenter study. Pain Med 2009; **10**:364–372.

Table 1 Patients' and pain medications characteristics

	Total
Age; median yr (IQR)	85 (13)
Gender; M/F (ratio)	92/165 (0.56)
Race; n (%)	
Italian	241 (93.8%)
Arab	7 (2.7%)
Est-European	7 (2.7%)
African-American	2 (0.8%)
Triage priority level; n (%)	
Emergency/Urgent	49 (19.1%)
Semi-urgent/Non-urgent	208 (80.9%)
Educational attainment (yr); n (%)	
0	11 (4.3%)
5	74 (28,8%)
8	108 (42.0%)
13	56 (21.8%)
18	8 (3.1%)
Residence; n (%)	
Home	155 (60.3%)
Retirement home	102 (39.7%)
Long staying in ED, minutes (min, max)	190 (range 11-600)
Presence of a carer; n (%)	151 (58.8%)
Marital status; n (%)	
Married	84 (32.7%)
Unmarried	173 (67.3%)

yr: year; IQR: interquartile range;

Table 2 Multivariate Logistic Analysis of Predictor Variables for Drug administration, pain medication with opioids, therapy administration time, discharge medications.

		Any ED pain medication	Any ED opioid medication	Discharge pain therapy	Pain therapy in appropriate time (all patients)	Pain therapy in appropriate time for low-urgent patients
Model Variables		**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**
	Patient Sex (men ref.)	0,92 (0,49-1,73)	**0,36 (0,15-0,89)**	1,28 (0,56-2,91)	1,03 (0,53-1,99)	1,57 (0,75-3,31)
	Patient Age	0,98 (0,96-1,00)	-	0,99 (0,96-1,02)	0,98 (0.95-1,01)	0,98 (0,96-1,00)
	Pain location					
	Abdomen	Ref.	-	Ref.	Ref.	Ref.
	Legs	**0,32 (0,12-0,86)**	-	0,38 (0,12-1,23)	0,53 (0,22-1,30)	0,46 (0,18-1,23)
	Arms	0,47 (0,13-1,66)	-	0,52 (0,09-3,07)	0.91 (0,27-3.07)	0,92 (0,25-3,32)
	Spine	0,83 (0,22-3,17)	-	0,96 (0,10-9,09)	1,56 (0,43-5,59)	0,97 (0,24-3,85)
	Lumbar region	1,04 (0,22-4,79)	-	0,21 (0,04-1,15)	0.85 (0.15-4.73)	0,67 (0,12-3,96)
	Head	**0,29 (0,10-0,84)**	-	0,39 (0,11-1,39)	0,65 (0,23-1,78)	0,60 (0,18-1,96)
	Chest	0,73 (0,28-1,94)	-	1,02 (0,20-5,26)	1,12 (0,41-3,06)	1,14 (0,37-3,46)
	Carer' presence	**6,19 (2,60-14,75)**	**4,82 (1,38-16,84)**	1,77 (0,68-4,66)	**2,82 (1,15-6,87)**	**3,23 (1,24-8,43)**
	Trauma (no trauma ref.)	1,61 (0,77-3,39)	-	1,87 (0,74-4,77)	-	-P=0,23

	Discharge to home	0,93 (0,41-2,08)	-	0,69 (0,27-1,81)	0,54 (0,23-1,31)	0,66 (0,25-1,71)
	Attending physician's gender (men ref.)	1,17 (0,53-2,57)	-	1,30 (0,40-4,16)	-	-
	Attending physician's age (cat. variable, ref. Age<=41 years)	1,05 (0,56-1,96)	-	0,98 (0,92-1,04)	-	-

Figure Legends.

Fig. 1 Directed Acyclic Graph (DAG) for ‘‘oligoanalgesia pathway’’ in the ED. A directed path is a sequence of arrows, a graph is acyclic if no directed path forms a closed loop. An arrow between two variables represents the possible presence of causal influence.

Fig 2: Acute pain-behavior scale for older persons with inability to communicate verbally.